Worksheet 1 Structure of the internet Answers

Task 1

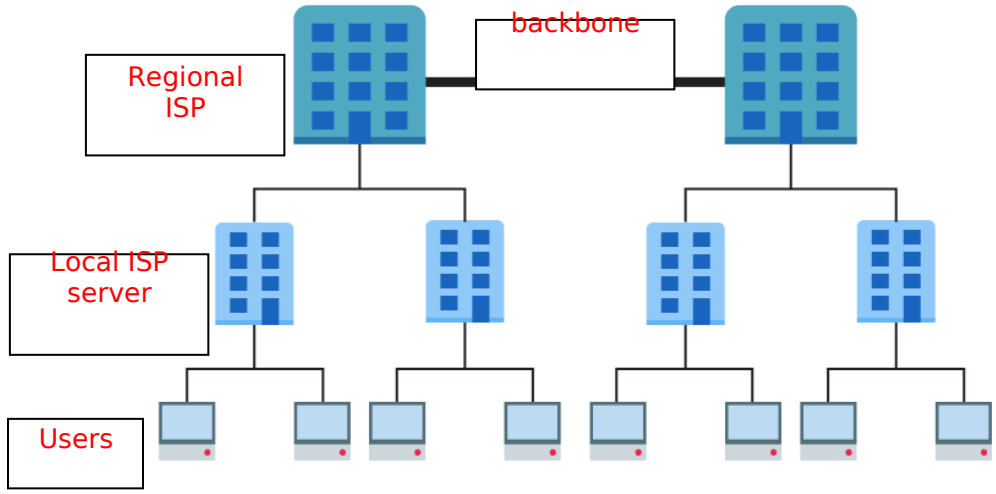
1. Define the following Computing terms:

   a. The Internet – A public interconnection of computer networks allowing data to be sent globally to any connected device.

   b. World Wide Web – A collection of hyperlinked documents accessible via the Internet.

   c. Backbone – A set of dedicated, high transmission rate network connections between geographical locations providing the core infrastructure for the Internet.

2. Label the diagram of the structure of the different levels of the Internet:



3. IP version 4 addresses such as 13.1.67.234 and 115.90.12.101 are used to identify devices on a network. As such they need to be unique for each device.

   a. The value of each number in an IP address ranges from 0 to 255. Calculate how many addresses are possible in theory.
   Working: 256 x 256 x 256 x 256
   Answer: 4,294,967,296

   b. Explain why version 4 is not enough for use on the Internet.

   In 2016, there are more than 3 billion Internet users, many with multiple computing devices
   Each device on a network needs a unique IP address
   Some addresses are private and cannot be used on the Internet

As the Internet gets bigger more and more addresses are used – 4 billion addresses is not enough!

Task 2

1. IP addresses are difficult for humans to remember. DNS provides a resolution of domains names and the IP addresses.

   If you type 216.58.213.174 into the address bar of your browser, you should get the www.google.co.uk webpage.

   We type the URL as it is easier to remember but it is just a label for the actual IP address that connects your computer to the Google servers.

   Use the website http://ping.eu/nslookup to find the IP addresses of the following three websites and two more of your choice:

Website	IP address
google.co.uk	
bbc.co.uk	
en.wikipedia.org	

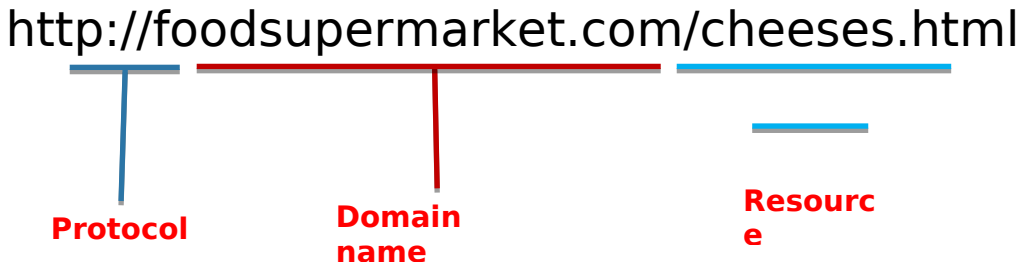
   Check they work by typing them into a browser address bar. (Some only work in one direction.)

   Compare your results with other people. They may be different. Can you explain why?

   Large websites need multiple connections for their servers to balance their load evenly and not create a bottleneck of requests. DNS requests made can be directed to a group of different IP addresses.

2. URLs are used to specify the location and means of accessing a resource across a network.

   Correctly label the parts of the following URL with '**Domain name**', '**Protocol**', '**Resource**':



Task 3

Read the following explanation of "physical" vs "logical" network topologies:

A "bus" is simply a wire or cable. At its simplest, a bus network is just two computers linked together by a wire. You can add more computers and join more computers to the bus network, but only one computer can use the bus at any one time.

In an Ethernet network, computers use a collision detection algorithm called CSMA/CD (Carrier Sense Multiple Access/Collision avoidance) to deal with this problem.

If the wire is too long, the signal degrades, so **hubs** were inserted to act as repeaters at various points. This allowed many **physical** buses to act like one **logical** bus.

It did not solve the problem of collisions, in fact it made the problem worse because it was easy to add more computers to the network.

If the **hub** is replaced by an intelligent **switch**, the switch knows which of the physical buses is attached to it, so a signal is sent only to the buses that the destination computer is attached to.

So what you now have is a number of computers connected to a switch – which, hey presto, is a physical star network! But it is still using a bus protocol, so it is a logical bus network.

(a) Explain in your own words the difference between a logical and physical topology.

Physical topology is the actual design layout of the network.

Logical topology is the shape of the path the data travels in, and describes how the devices communicate across the physical topology, defined by the protocol used (e.g. Ethernet)..

Task 4

Advantages and disadvantages of each topology

BUS TOPOLOGY:

Advantages	Disadvantages
Easy to connect a computer or peripheral to a linear bus	Entire network shuts down if there is a break in the cable
Requires less cable than a star topology	Difficult to identify the problem if the network shuts down
	Heavy traffic degrades performance

STAR TOPOLOGY:

Advantages	Disadvantages
Easy to install and wire	Requires more cable length than a linear bus topology
No disruptions to the network when connecting or removing devices	If the network switch fails, all nodes attached to the switch are disabled and cannot communicate
Easy to detect faults	More expensive than linear bus topology because of the cost of the network switches